

## CLAIMS

What is claimed is:

1. A method for approximating a quadratic Bezier curve with straight edges, the curve being represented by a first anchor point, a control point, and a second anchor point, the method comprising:

- (1) pushing the first anchor point, the control point, and the second anchor point into a memory stack;
- (2) popping out the top three points in the memory stack as points a2, c, and a1;
- (3) computing a flatness F of a line formed between the points a2 and a1, wherein the flatness F is calculated as follows:

$$F(a1, c, a2) = S(a1, c, a2) / |a1a2|,$$

where S(a1, c, a2) is a triangular area formed by the points a1, c, and a2, and |a1a2| is the distance between the points a1 and a2;

- (4) determining if the flatness F is less than a threshold;
- (5) if the flatness F is less than a threshold:
  - (a) adding an edge between the points a1 and a2 to an active edge list;
  - (b) pushing the point a1 back into the memory stack.

2. The method of claim 1, further comprising:

- (6) if the flatness F is not less than a threshold:
  - (a) determining if the memory stack is full;
  - (b) if the memory stack is full:

- (i) adding an edge between the points a1 and a2 to the active edge list;
  - (ii) pushing the point a1 back into the memory stack;
- (c) if the memory stack is not full, dividing the quadratic Bezier curve as follows:
- (i) determining a midpoint c1 in a line between the points a1 and c;
  - (ii) determining a midpoint c3 in a line between the points a2 and c;
  - (iii) determining a midpoint c2 in a line between the points c1 and c3;
  - (iv) pushing the points a2, c2, c3, c1, and a2 back into the memory stack;
  - (v) looping back to step (2) and repeating the above steps.

3. The method of claim 2, further comprising calculating  $S(a1, c, a2)$  as follows:

$$S(\text{divided}) = S(\text{original}) / 8,$$

wherein  $S(\text{original})$  is a previous triangular area and  $S(\text{divided})$  is a subsequent triangular area.

4. The method of claim 1, further comprising dividing another quadratic Bezier curve at an inflection point to form the quadratic Bezier curve.
5. A method for approximating a quadratic Bezier curve with straight edges, the quadratic Bezier curve being represented by a first anchor point p0, a control point p1, and a second anchor point p2, the method comprising:

determining a first flatness of a line formed between the first anchor point p0 and the second anchor point p2, wherein the first flatness is a first quotient of (1) a first triangular area formed by the first anchor point p0, the control point p1, and

the second anchor point  $p_2$  divided by (2) a first distance between the first anchor point  $p_0$  and the second anchor point  $p_2$ ;

if the first flatness is less than a threshold, replacing the curve with an edge between the first anchor point and the second anchor point.

6. The method of claim 5, further comprising:

if the first flatness is greater than the threshold:

dividing the quadratic Bezier curve into a first portion and a second portion, wherein (1) the first curve comprises the first anchor point  $p_0$ , a first intermediate control point  $c_1(1)$ , and a first intermediate anchor point  $c_2(1)$ , and (2) the second curve comprises the first intermediate anchor point  $c_2(1)$ , a second intermediate control point  $p_1(1)$ , and the second anchor point  $p_2$ :

determining a second flatness of a line formed between the first intermediate anchor point  $c_2(1)$  and the second anchor point  $p_2$ , wherein the second flatness is a second quotient of (1) a second triangular area formed by the first intermediate anchor point  $c_2(1)$ , the second intermediate control point  $p_1(1)$ , and the second anchor point  $p_2$  divided by (2) a second distance between the first intermediate anchor point  $c_2(1)$  and the second anchor point  $p_2$ ;

if the second flatness is less than the threshold, replacing the second curve with a second edge between the first intermediate anchor point  $c_2(1)$  and the second anchor point  $p_2$ .

7. The method of claim 6, wherein:

the first intermediate control point  $c_1(1)$  is a midpoint in a line between the first anchor point  $p_0$  and the control point  $p_1$ ;

the second intermediate control point  $p1(1)$  is a midpoint in a line between the second anchor point  $p2$  and the control point  $p1$ ; and

the first intermediate anchor point  $c2(1)$  is a midpoint in a line between the first intermediate control point  $c1(1)$  and the second intermediate control point  $p1(1)$ .

8. The method of claim 6, further comprising, if the second flatness is greater than the threshold:

dividing the second portion into a third portion and a fourth portion, wherein (1) the third portion comprises the first intermediate anchor point  $c2(1)$ , a third intermediate control point  $c1(2)$ , and a second intermediate anchor point  $c2(2)$ , and (2) the fourth portion comprises the second intermediate anchor point  $c2(2)$ , a fourth intermediate control point  $p1(2)$ , and the second anchor point  $p2$ :

determining a third flatness of a line formed between the second intermediate anchor point  $c2(2)$  and the second anchor point  $p2$ , wherein the third flatness is a third quotient of (1) a third triangular area formed by the second intermediate anchor point  $c2(2)$ , the fourth intermediate control point  $p1(2)$ , and the second anchor point  $p2$  divided by (2) a third distance between the second intermediate anchor point  $c2(2)$  and the second anchor point  $p2$ ;

if the third flatness is less than the threshold, replacing the third curve with a third edge between the second intermediate anchor point  $c2(2)$  and the second anchor point  $p2$ .

9. The method of claim 8, wherein:

the third intermediate control  $c1(2)$  point is a midpoint in a line between the first intermediate anchor point  $c2(1)$  and the second intermediate control point  $p1(1)$ ;

the fourth intermediate control point  $p1(2)$  is a midpoint in a line between the second anchor point  $p2$  and the second intermediate control point  $p1(1)$ ; and

the second intermediate anchor point  $c2(2)$  is a midpoint in a line between the third intermediate control point  $c1(2)$  and the fourth intermediate control point  $p1(2)$ .

10. The method of claim 6, further comprising, if the second flatness is less than the threshold:

determining a third flatness of a line formed between the first intermediate anchor point  $c2(1)$  and the first anchor point  $p0$ , wherein the third flatness is calculated as (1) a third triangular area formed by the first intermediate anchor point  $c2(1)$ , the first intermediate control point  $c1(1)$ , and the first anchor point  $p0$  divided by (2) a third distance between the first intermediate anchor point  $c2(1)$  and the first anchor point  $p0$ ;

if the third flatness is less than the threshold, replacing the first curve with an edge between the first intermediate anchor point  $c2(1)$  and the first anchor point  $p0$ .

11. The method of claim 8, further comprising calculating the second and the third triangular areas as follows:

$$S(\text{divided}) = S(\text{original}) / 8,$$

wherein  $S(\text{original})$  is a previous triangular area and  $S(\text{divided})$  is a subsequent triangular area.

12. The method of claim 5, further comprising dividing another quadratic Bezier curve at an inflection point to form the quadratic Bezier curve.